

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Date: December 5, 2003

In re Application of:

DAVID J. EDLUND, WILLIAM A. PLEDGER and
R. TODD STUDEBAKER

Filed : December 5, 2003

For : HYDROGEN PURIFICATION MEMBRANES,
COMPONENTS AND FUEL PROCESSING SYSTEMS
CONTAINING THE SAME

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

S i r:

INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. §§ 1.56, 1.97, and 1.98

Applicants are submitting this Information Disclosure Statement pursuant to 37 C.F.R. §§ 1.56, 1.97, and 1.98 to disclose to the Patent Office the patents, publications, applications, and/or other references listed on the enclosed, completed PTO-1449 forms. The filing of this Information Disclosure Statement should not be construed as a representation that a search has been made or as an admission that the listed references are prior art for this application. Applicants respectfully request that the listed references be expressly considered during prosecution of the application, and that the references be made of record therein and appear among the "references cited" on any patents issuing therefrom.

This Information Disclosure Statement includes 20 pages of PTO-1449 forms; however, it does not include copies of the references listed on the forms, as permitted under 37 C.F.R. § 1.98(d), because copies already were provided in earlier U.S. applications (Serial No. 10/430,110, Serial No. 10/371,597, now U.S. Patent No. 6,632,270, Serial No. 10/027,509, now U.S. Patent No. 6,537,352, Serial No. 10/003,165, now U.S. Patent No. 6,458,189, Serial No. 09/839,997, Serial No. 09/618,866, now U.S. Patent No. 6,547,858 and Serial No. 09/967,172, now U.S. Patent No. 6,494,937) that are relied on here for an earlier effective filing date under 35 U.S.C. § 120.

Although resubmission of print copies of the references listed on the enclosed PTO-1449 forms is not required, the Examiner is invited to contact Applicants' undersigned attorney if print copies of the previously submitted references would be helpful to advance prosecution of the present application.

A concise explanation of the relevance of each listed reference not in the English language follows:

Japanese Patent No. 45-14404 was listed on the face sheet to U.S. Patent No. 5,888,273 and no translation or English language abstract was provided. The patent appears to disclose a gas purification unit having a plurality of membrane tubes 1 through which a feed stream 4 is separated into streams 3C and 6.

Japanese Patent No. 45-2642 was listed on the face sheet to U.S. Patent No. 5,888,273 and no translation or English language abstract was provided. The patent appears to disclose a gas purification unit in which a feed stream 3 is passed through several passages to separation membranes, where the feed stream is separated to form streams 4 and 17. Applicant understands that reference numeral 1 refers to a flange, reference numeral 2 refers to a base, reference numeral 3 refers to a source gas introduction line, reference numeral 4 refers to a gas exhaust line, reference numeral 5 refers to a cylinder, reference numeral 6 refers to a guide structure, reference numeral 7 refers to an impure gas introduction control, reference numeral 8 refers to a square pipe, reference numeral 9 refers to a square-shaped hydrogen permeable board, reference numeral 10 refers to a palladium alloy membrane, reference numeral 11 refers to a support board, reference numeral 12 refers to a peripheral weld, reference numeral 13 refers to a pure hydrogen extractor, reference numeral 14 refers to a flange, reference numeral 15 refers to a pure hydrogen mixture chamber, reference numeral 16 refers to a passage member, reference numeral 17 refers to a pure hydrogen mixture extraction nozzle, reference numeral 18 refers to a cover, reference numeral 19 refers to an electric heater, reference numeral 20 refers to a source gas preparatory heating portion for heating gas outside the outer wall of the square pipe and inside the inner wall of the circular pipe, and reference numeral 21 refers to an insert for an electric heater to regulate the temperature of the pure hydrogen permeable cell.

Japanese Patent No. 57-145276, for which Applicants do not have an English-language abstract or translation, appears to disclose a schematically illustrated system that includes a burner 5 and various valves 8. Applicants are not aware of the function of the other components.

Japanese Patent No. 1-145302 was listed on the face sheet to U.S. Patent No. 5,888,273 and no translation or English language abstract was provided. The patent appears to disclose a gas purification unit in which a feed stream 1 is passed through several passages and separated into streams 2 and 3.

Japanese Patent No. 1-145303 was listed on the face sheet to U.S. Patent No. 5,888,273 and no translation or English language abstract was provided. The patent appears to disclose a gas purification unit in which a feed stream 1 is passed through several passages and separated into streams 2 and 3.

Japanese Patent No. 4163860 appears to disclose a schematically illustrated system that includes a controller 26.

Japanese Patent No. 6-134244 was listed on the face sheet to U.S. Patent No. 5,888,273 and no translation or English language abstract was provided. The patent appears to disclose a gas purification unit in which a feed stream is separated into plural streams.

PCT International Patent Application No. PCT/DE97/00880 (WO 97/43796) claims to disclose a membrane reactor that catalytically reacts methanol to produce a product stream containing hydrogen, carbon dioxide and carbon monoxide, filters carbon dioxide from the reaction product stream, and

then catalytically converts the carbon monoxide methane into methane prior to delivery of the product stream to a fuel cell.

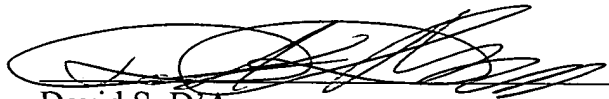
English language abstracts for Japanese Patent No. JP 1-26290, Japanese Patent No. JP 4-338101 and PCT Patent Publication No. WO 00/04600 are already of record in the previously cited applications identified above.

This Information Disclosure Statement is being filed with the application. Therefore, in accordance with 37 C.F.R. § 1.97(b), no fee or statement under 37 C.F.R. § 1.97(e) is required.

Please contact the undersigned with any questions or comments regarding this Information Disclosure Statement.

Respectfully submitted,

KOLISCH HARTWELL, P.C.



David S. D'Ascenzo

Registration No. 39,952

PTO Customer No. 23581

Kolisch Hartwell, P.C.

520 S.W. Yamhill Street, Suite 200

Portland, Oregon 97204

Telephone: (503) 224-6655

Facsimile: (503) 295-6679

FORM PTO-1449			DOCKET NUMBER		APPLICATION NUMBER	
INFORMATION DISCLOSURE CITATION IN AN APPLICATION			NPW 301K			
			APPLICANTS DAVID J. EDLUND, WILLIAM A. PLEDGER and R. TODD STUDEBAKER			
			FILING DATE December 5, 2003		GROUP ART UNIT	
U.S. PATENT DOCUMENTS						
EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FIL. DATE IF APPROP.
	1,306,221	6/10/1919	Ellis			
	1,782,824	11/25/1930	Hechenbleikner			
	1,848,466	3/8/1932	Edmonds			
	2,132,151	10/4/1938	Fenske et al.			
	2,450,804	10/5/1948	Loy			
	2,609,059	9/2/1952	Benedict			
	2,824,620	2/25/1958	De Rosset			
	3,094,391	6/18/1963	Mader			
	3,144,312	8/11/1964	Mertens			
	3,208,198	9/28/1965	Rubin			
FOREIGN PATENT DOCUMENTS						
	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB CLASS	TRANSLATION YES NO
	JP 45-14404	5/1970	Japan			
	JP 45-2642	9/1970	Japan			X
	JP 57-145276	9/1982	Japan			X
OTHER DOCUMENTS						
		English-language abstract of Japanese Patent No. 1-262903, 1989.				
		English-language abstract of Japanese Patent No. 432150, 1992.				
		English-language abstract of Japanese Patent No. 513230, 1993.				
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	3,336,730	8/22/1967	McBride et al.			
	3,338,681	8/29/1967	Kordesch			
	3,344,586	10/3/1967	Langley et al.			
	3,350,176	10/31/1967	Green et al.			
	3,356,538	12/5/1967	Miekka et al.			
	3,368,329	2/13/1968	Eguchi et al.			
	3,428,476	2/18/1969	Langley et al.			
	3,439,474	4/22/1969	McKinley			
	3,447,288	6/3/1969	Juda et al.			
	3,450,500	6/17/1969	Setzer et al.			
	3,469,372	9/30/1969	Yamauchi et al.			
FOREIGN PATENT DOCUMENTS						
	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB CLASS	TRANSLATION YES NO
	JP 1-145302	6/1989	Japan			
	JP 1-145303	6/1989	Japan			X
	JP 1262903	10/1989	Japan			X
OTHER DOCUMENTS						
		English-language abstract of Japanese Patent No. 514790, 1993.				
		English-language abstract of Japanese Patent No. 4-338101.				
		English-language abstract of Japanese Patent No. 604070, 1994.				
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	3,469,944	9/30/1969	Bocard et al.				
	3,486,301	12/30/1969	Bonnet				
	3,520,803	7/21/1970	Iaconelli				
	3,524,819	8/18/1970	Guerrieri				
	3,534,531	10/20/1970	Eguchi et al.				
	3,564,819	2/23/1971	Neulander et al.				
	3,589,171	6/29/1971	Haley				
	3,665,680	5/30/1972	Heuser				
	3,713,270	1/30/1973	Farr et al.				
	3,761,382	9/25/1973	Hammond et al.				
	3,782,904	1/1/1974	Fletcher				
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	EP 0434562 A1	6/26/1991	EPO			X	
	JP 4-163860	6/1992	Japan				X
	JP 4-338101	11/1992	Japan				X
OTHER DOCUMENTS							
		English-language abstract of Japanese Patent No. 634540.					
		English-language abstract of Japanese Patent No. 710910, 1995.					
		English-language abstract of Japanese Patent No. 828793, 1996.					
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	3,787,038	1/22/1974	Tesner et al.			
	3,791,106	2/12/1974	Haley			
	3,839,110	10/1/1974	Shankoff			
	3,849,076	11/19/1974	Gryaznov et al.			
	3,881,891	5/6/1975	Goltsov et al.			
	3,881,897	5/6/1975	Faure et al.			
	3,920,416	11/18/1975	Houseman			
	3,955,941	5/11/1976	Houseman et al.			
	3,972,695	8/3/1976	Buckley et al.			
	3,980,452	9/14/1976	Krumm et al.			
FOREIGN PATENT DOCUMENTS						
	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB CLASS	TRANSLATION YES NO
	JP 6-134244	5/1994	Japan			
	WO 97/25649	7/1997	WIPO			X
	WO 97/43796	11/1997	WIPO			X
OTHER DOCUMENTS						
		English-language abstract of Japanese Patent No. 6176779, 1994.				
		English-language abstract of Japanese Patent No. 7057758, 1995.				
		English-language abstract of Japanese Patent No. 11116202, 1999.				
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	3,982,910	9/28/1976	Houseman et al.				
	4,003,343	1/18/1977	Lee				
	4,003,725	1/18/1977	Bunn, Jr. et al.				
	4,056,373	11/1/1977	Rubin				
	4,078,985	3/14/1978	Takeuchi				
	4,084,934	4/18/1978	Kumazawa				
	4,098,959	7/4/1978	Fanciullo				
	4,098,960	7/4/1978	Gagnon				
	4,127,393	11/28/1978	Timmins et al.				
	4,132,668	1/2/1979	Gryaznov et al.				
	4,134,739	1/16/1979	Gulden et al.				
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	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB CLASS	TRANSLATION YES NO	
	WO 99/30806	6/1999	WIPO			X	
	WO 99/65097	12/1999	WIPO			X	
	WO 00/04600	1/2000	WIPO				X
OTHER DOCUMENTS							
		English-language abstract of Japanese Patent No. 57-145276.					
		English-language abstract of Japanese Patent No. 1-145302.					
		English-language abstract of Japanese Patent No. 1-145303.					
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	4,197,152	4/8/1980	Palty et al.			
	4,238,403	12/9/1980	Pinto			
	4,248,688	2/3/1981	Gartner et al.			
	4,254,086	3/3/1981	Sanders			
	4,302,177	11/24/1981	Fankhanel et al.			
	4,313,013	1/26/1982	Harris			
	4,315,893	2/16/1982	McCallister			
	4,319,923	3/16/1982	Falanga et al.			
	4,329,157	5/11/1982	Dobo et al.			
	4,331,520	5/25/1982	Juda et al.			
	4,349,613	9/14/1982	Winsel			
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	WO 00/27507	5/2000	WIPO			X
	WO 01/03086	1/2001	WIPO			X
	EP 1065741 A2	1/3/2001	EPO			X
OTHER DOCUMENTS						
		English-language abstract of Great Britain Patent No. 2,305,186.				
		English-language abstract of German language PCT Patent Application Serial No. WO 00/04600, 2000.				
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	4,381,641	5/3/1983	Madgavkar et al.				
	4,387,434	6/7/1983	Moncrief, Jr. et al.				
	4,400,182	8/23/1983	Davies et al.				
	4,417,905	11/29/1983	Banks et al.				
	4,422,911	12/27/1983	Juda et al.				
	4,430,304	2/7/1984	Spurrier et al.				
	4,444,158	4/24/1984	Yoon				
	4,468,235	8/28/1984	Hill				
	4,472,176	9/18/1984	Rubin				
	4,473,622	9/25/1984	Chludzinski et al.				
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	WO 01/28662	4/2001	WIPO			X	
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		Adris, A. M., et al., "A Fluidized Bed Membrane Reactor for the Steam Reforming of Methane," The Canadian Journal of Chemical Engineering, Vol. 69, pp. 1061-70 (October, 1991).					
		Amphlett, J. C., et al., "On Board Hydrogen Purification for Steam Reformer/PEM Fuel Cell Vehicle Power Plants," Energy Progress X, Proceedings of the 10 th World Hydrogen Energy Conference, Cocoa Beach, Florida, U.S.A., Vol. 3, pp. 1681-90 (June, 1994).					
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	4,504,447	3/12/1985	Spurrier et al.				
	4,533,607	8/6/1985	Sederquist				
	4,553,981	11/19/1985	Fuderer				
	4,567,857	2/4/1986	Houseman et al.				
	4,589,891	5/20/1986	Iniotakis et al.				
	4,642,273	2/10/1987	Sasaki				
	4,644,751	2/24/1987	Hsu				
	4,650,814	3/17/1987	Keller				
	4,654,063	3/31/1987	Auvil et al.				
	4,655,797	4/7/1987	Iniotakis et al.				
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		Amphlett, J. C., et al., "Simulation of a 250 kW Diesel Fuel Processor/PEM Fuel Cell System," Fifth Grove Fuel Cell Symposium, Commonwealth Institute, London, U.K., p. 8 (September 22-25, 1997).					
		Chai, M., et al., "Promotion of Methane Steam Reforming Using Ruthenium-Dispersed Microporous Alumina Membrane Reactor," Chemistry Letters, The Chemical Society of Japan, pp. 41-44 (1993).					
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	4,657,828	4/14/1987	Tajima				
	4,659,634	4/21/1987	Struthers				
	4,670,359	6/2/1987	Beshty et al.				
	4,684,581	8/4/1987	Struthers				
	4,699,637	10/13/1987	Iniotakis et al.				
	4,713,234	12/15/1987	Weirich et al.				
	4,751,151	6/14/1988	Healy et al.				
	4,781,241	11/1/1988	Misage et al.				
	4,788,004	11/29/1988	Pinto et al.				
	4,810,485	3/7/1989	Marianowski et al.				
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OTHER DOCUMENTS							
		"Compact, Lightweight Fuel Reformer for Fuel Cells," Argonne National Laboratory/U.S. Department of Energy (July, 1996).					
		Edlund, Dr. David and William Pledger, "Development of a Compact and Economical Steam Reformer for Fuel-Cell Systems," Fifth Grove Fuel Cell Symposium, Commonwealth Institute, London, U.K., p. 6 (September 22-23, 1997).					
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EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FIL. DATE IF APPROP.	
	4,838,897	6/13/1989	Amano et al.				
	4,849,187	7/18/1989	Uozu et al.				
	4,865,624	9/12/1989	Okada				
	4,880,040	11/14/1989	Pierson et al.				
	4,904,455	2/27/1990	Karafian et al.				
	4,904,548	2/27/1990	Tajima				
	4,946,667	8/7/1990	Beshty				
	4,981,676	1/1/1991	Minet et al.				
	4,999,107	3/12/1991	Guerif				
	5,030,661	7/9/1991	Lywood				
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		Edlund, David J. and William A. Pledger, "The Practical Use of Metal-Membrane Reactors for Industrial Applications," The 1995 Membrane Technology Reviews, pp. 89-97 (November, 1994).					
		Emonts, B., et al., "Compact Methanol Reformer Test for Fuel-Cell Powered Light-Duty Vehicles," Fifth Grove Fuel Cell Symposium, Commonwealth Institute, London, U.K., p. 42 (September 22-25, 1997).					
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	5,032,365	7/16/1991	Aono et al.			
	5,126,045	6/30/1992	Kohlheb et al.			
	5,139,541	8/18/1992	Edlund			
	5,158,581	10/27/1992	Coplan			
	5,205,841	4/27/1993	Vaiman			
	5,215,729	6/1/1993	Buxbaum			
	5,217,506	6/8/1993	Edlund et al.			
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	5,229,102	7/20/1993	Minet et al.			
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		Jørgensen, S. Lægsgaard, et al., "Application of Pd-Membranes for the Production of Pure Hydrogen in Methanol-Based Fuel Cell Powered Vehicles," Proceedings of Fourth Workshop: Optimisation of Catalytic Membrane Reactor Systems, ESF Network, Catalytic Membrane Reactors, Oslo, Norway, pp. 51-57 (May 30-31, 1997).				
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	5,259,870	11/9/1993	Edlund			
	5,326,550	7/5/1994	Adris et al.			
	5,335,628	8/9/1994	Dunbar			
	5,344,721	9/6/1994	Sonai et al.			
	5,354,547	10/11/1994	Rao et al.			
	5,376,167	12/27/1994	Broutin et al.			
	5,382,271	1/17/1995	Ng et al.			
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	Re. 35,002	7/25/1995	Matsubara et al.			
	5,449,848	9/12/1995	Itoh			
	5,458,857	10/17/1995	Collins et al.			
	5,498,278	3/12/1996	Edlund			
	5,500,122	3/19/1996	Schwartz			
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		Minet, R. G., et al., "Experimental Studies of A Ceramic Membrane Reactor for the Steam/Methane Reaction at Moderate Temperatures (400-700°C)," Symposium on Natural Gas Upgrading II Presented before The Division of Petroleum Chemistry, Inc., Meeting of American Chemical Society, San Francisco, California, U.S.A., pp. 245-48 (April, 1992).				
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	5,527,632	6/18/1996	Gardner			
	5,536,405	7/16/1996	Myrna et al.			
	5,580,523	12/3/1996	Bard			
	5,589,599	12/31/1996	McMullen et al.			
	5,612,012	3/18/1997	Soma et al.			
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	5,658,681	8/19/1997	Sato et al.			
	5,677,073	10/14/1997	Kawatsu			
	5,679,249	10/21/1997	Fendya et al.			
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	5,712,052	1/27/1998	Kawatsu			
	5,714,276	2/3/1998	Okamoto			
	5,734,092	3/31/1998	Wang et al.			
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	5,811,065	9/22/1998	Sterenber				
	5,814,112	9/29/1998	Elliot et al.				
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	5,874,051	2/23/1999	Heil et al.				
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	5,897,970	4/27/1999	Isomura et al.				
	5,904,754	5/18/1999	Juda et al.				
	5,931,987	8/3/1999	Buxbaum				
	5,932,181	8/3/1999	Kim et al.				
	5,938,800	8/17/1999	Verrill et al.				
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	6,458,189	10/1/2002	Edlund et al.				
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	6,494,937	12/17/2002	Edlund et al.				
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